

3D Modeling Kanohi in Blender Tutorial for Beginners

By: KhingK

First Edition

Note: This is a Work-in-Progress so content might get added or edited as time goes by

Also Note: This Tutorial is specifically made for the latest version of **Blender 2.79**

August 8, 2020 update: Tutorial File has been added to save time regarding setup

Part I: The Concept Behind It

To start, we have to know what is the essence of Kanohi making.

The essence is understanding what makes Bionicle..Bionicle.

Bionicle is made up of mostly biomechanical beings. Most Kanohi capture that idea in the form of straight lines and curvy lines. These lines are the framework of the mask.

Straight lines are more mechanical-looking while curvy lines are more organic-looking. The balance and mixing of the two help to make the Kanohi distinct and aesthetically pleasing. There is one key feature to keep in mind when looking at a Kanohi: its silhouette. The silhouette of the mask is what the mask looks like in darkness. In darkness, only the outline of the mask is shown. This outline is what makes a mask unique. Mastering the shape of the silhouette helps to make the mask stand out, avoids repeating the same mask design, and allows a person to fill in the rest of the mask design.

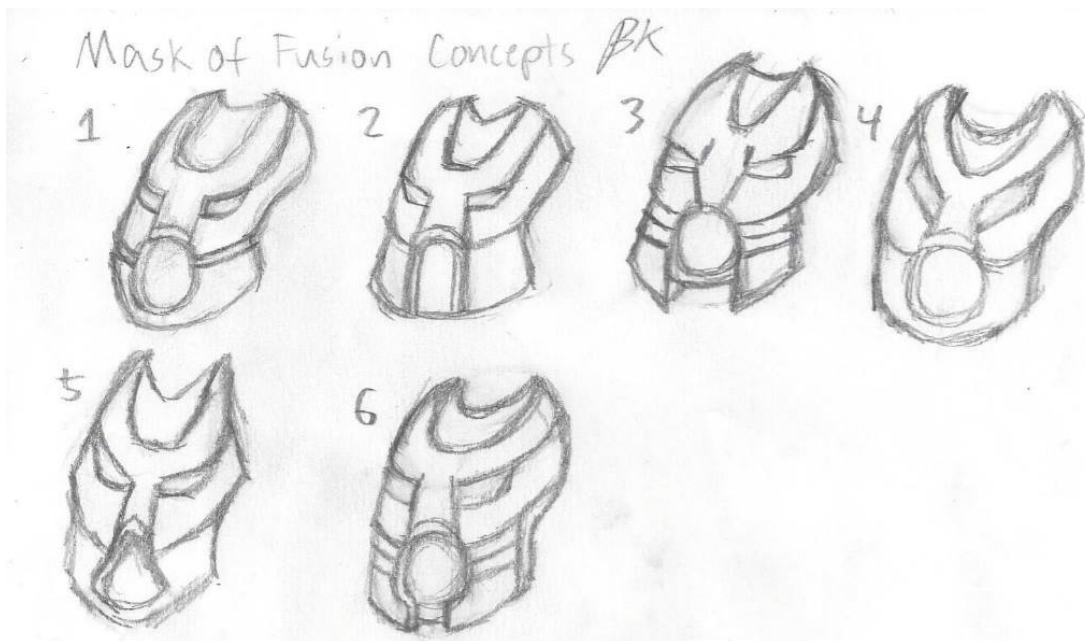
In some cases, the Kanohi can express the identity of the wearer through the shape. Usually, the shape can vaguely resemble real life objects that provide that context. For example, Vakama's noble Huna vaguely resembles a beard which matches Vakama's appearance as a Turaga (Old man). Depending on the shape, you can give a character a sense of wisdom (Noble Huna) or a sense of power (Kraahkan or G2 Mask of Creation). The Avohkii, another example, vaguely resembles the Sun with the outside side of the mask pointing outwards and this fits its power: Light.

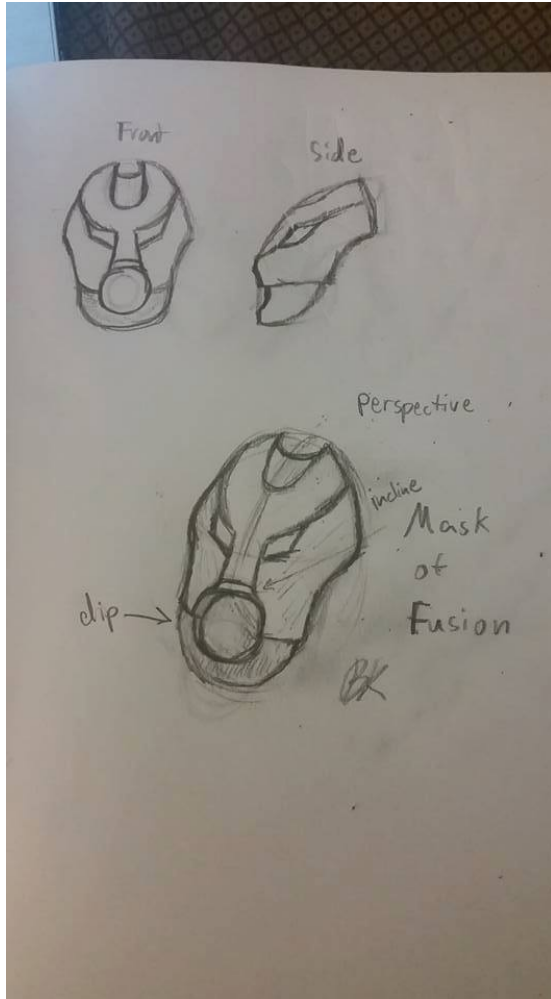
If you can understand the aesthetic, you should be able to design your own kind of Kanohi.

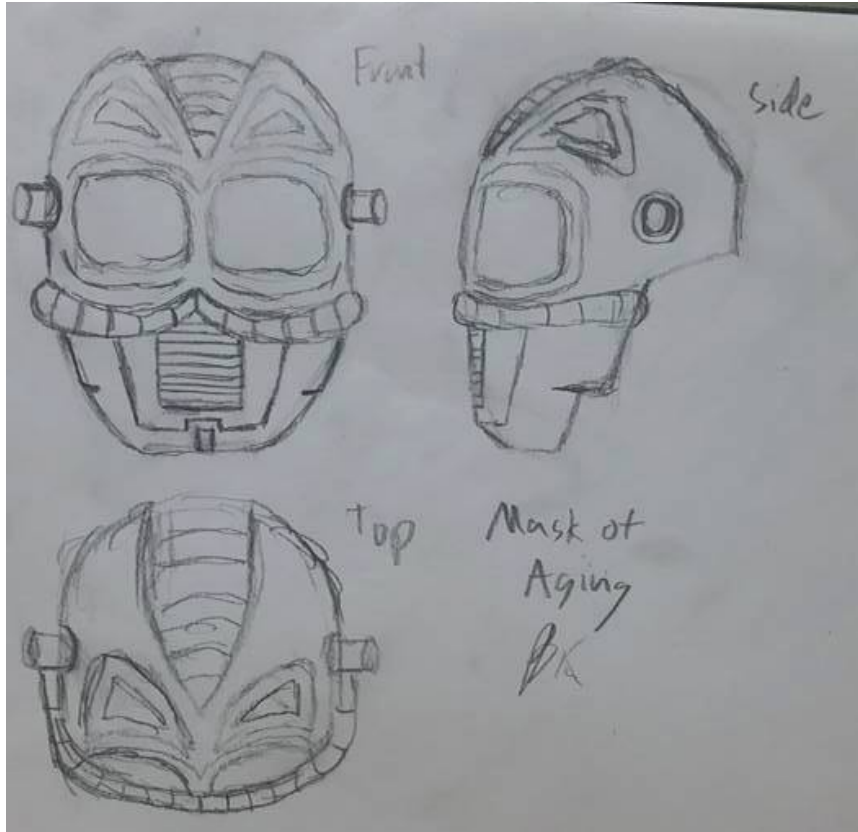
I highly recommend, before you even touch Blender, to start drawing out masks. You should practice on getting the aesthetics on paper first. If you don't know where to start, start by drawing some existing Kanohi that are out there (Pakari and Hau are good ones to start off with). You can grab any Kanohi from your bin of Bionicle pieces. Start by doing the front of the mask (that is usually the easiest part). Once you get the front of the mask drawn, flip the mask to its side and draw that side. Then, flip the mask so that the top is facing you and draw that side. There are some masks that can be very complicated to draw. If you are just starting to draw, I would stick with the Toa Mata masks since they are simpler.

The reason behind drawing all these sides is to get a hand at envisioning things in 3D. All Kanohi are not flat. They have a 3D aspect to it. Before you can touch 3D modeling, you have to be able to translate 2D images, put them together, and make a 3D image out of it. Once you have practiced this well enough, you should be ready to jump on Blender.

I have provided some of my earlier works in the images below that you can base things off of.







The Kanohi Aesthetic

To figure out the Kanohi Aesthetic, we first have to dive into the Bionicle Lore. In the Bionicle lore, there are four main types of Kanohi and these are governed by their power level: Powerless, Great, Noble, and Legendary. Kanohi are known to have a “standard” form which is the most common form the Kanohi takes. There are also countless variations that can exist that modify and completely change the shape of the Kanohi. It is known in the Bionicle lore that the Kanohi shape does NOT govern the Kanohi power.

The most important types of Kanohi that will be focused on for 3D modeling are the Great, the Noble, and the Variations. With 3D modeling, you have the freedom to make whatever mask you want. But if you would like to adhere to a Bionicle aesthetic, here are some considerations you can take to make it “fit” the Bionicle World. Note that these considerations do not always apply 100% of the time.

Great Masks:

Great masks are known to be more angular masks. These masks like to show off their shapes and tend to portray a “heroic” figure. They also tend to go further back towards the back of the head.

Noble Masks:

Noble masks are known to be less angular masks with more subtle shapes. These masks are usually like to portray more typical geometric shapes. The masks sometimes are more elongated vertically (but not always). They tend to be more flat and do not go towards the back of the head as much as the Great masks.

Variations:

There are plenty of variations of masks that have existed throughout the Bionicle sets and lore. Here are some of the most common ones and their style. It is noted that the comparisons below are focused on only the Great masks. However, variations can also apply to Noble masks as well.

Nuva: These masks take angular to a whole new level. Features on the Great masks are much more pronounced and tend to warp the original shape of the Great. The silhouette of the mask is more angular. Edges of the mask are softened and look more organic because of that. The mask has less holes and more indents. They also tend to be slightly bigger than their great versions.

Hordika: These masks are made to fit the special hordika heads. The masks are more elongated and tend to be very close to the head. These masks are not supposed to be too big and should not drag down below the head too much. The masks have to accomodate for a pinhole on the top of the head to allow an axle to be put through. These masks loosely resemble their Great versions, only taking a few of their features while adding in some new “beast like” aesthetics.

Organic: These masks are made to fit the Inika heads. These masks have softer edges and tend to show off some “teeth” or a mouth of some kind. The masks are also bigger than their Great counterparts and like to have bigger eyes. They also have more detail and more tubular like features. In terms of 3D modeling, not that many people have dived into modeling these masks mostly because 3D printing a rubber mask is very difficult (but hopefully, it won’t be in the future).

Aquatic: These masks tend to have various attachment areas and can sometimes include respirators and tubes being part of the mask. In some cases, they can be made compatible with visor pieces. Lightsaber rod sized holes can be placed in different areas around the mask to allow for tubes to be attached.

Adaptive: These masks are made to fit the environment they’re placed in. The Phantoka masks, for example, have a more aerodynamic feel which includes having vent-like features or features resembling fans and propellers. They may also have lightsaber rod sized holes or pinholes for attachments. The masks tend to be slightly more detailed than their Great counterparts and share some similarities.

Shapeshifted (Makuta Phantoka): These masks are made to fit the Makuta that wear them. The masks usually have more angular shapes and are slightly more detailed. They tend to have teeth or fangs and fit a more “nightmarish” look. The masks tend to go towards the back more. There are more edges present on the mask.

Scoped: This is a simple modification of adding a scope to the mask. Scopes are usually cylindrical in shape and can include a lightsaber rod sized hole. Careful attention should be made so that the scopes align with the eyes. Additionally, scoped masks are asymmetrical so scopes should be added after the symmetrical mask is complete.

The Duality of the Great and Noble masks:

An interesting trend I did find with Great and Noble mask shapes is that they tend to flip their outlines. A curved shape on a Great mask turns into a straight shape on the Noble mask or a straight shape on a Great mask turns into a curved shape on the Noble mask. This “Duality of Lines and Curves” can be utilized to help with switching back and forth between Great and Noble Mask design aesthetics.

A perfect example is the Great and Noble Huna as shown below. Notice the silhouette of the masks:



There are some exceptions to this “Duality” theory but it is one simple way of guiding your Kanohi design.

Part II: Essential Tools in Blender for 3D Modeling

Blender is a 3D modeling tool that I use mainly due to its versatility and being free of charge. I started my work with Blender at the end of August. At that time, I was mainly focused on assembling models instead of actually 3D modeling them. Eventually, around October, something clicked. I started to understand how to 3D model by experimenting around with extruding planes, adding edges, and creating new vertices. If you really want to learn how to 3D model Kanohi, it starts at this foundation.

If you are new to Blender, I highly recommend that you watch beginner tutorials online on how to navigate, insert objects, etc. Those should be given to you once you start making Kanohi. That is how I also started..I watched a lot of tutorials.

Here is an example video that I highly recommend watching.

<https://www.youtube.com/watch?v=LLV7h-WLlx0&t=19s>

You can also search it up on Youtube with words like “Blender beginner tutorial” or something like that. For the most part, I am assuming that you at least know some basics to Blender.

Now how do you start a Kanohi? Well let me give you some tools on what will be important first before I provide you a step by step process.

Download for Version 2.79: <https://download.blender.org/release/Blender2.79/latest/>

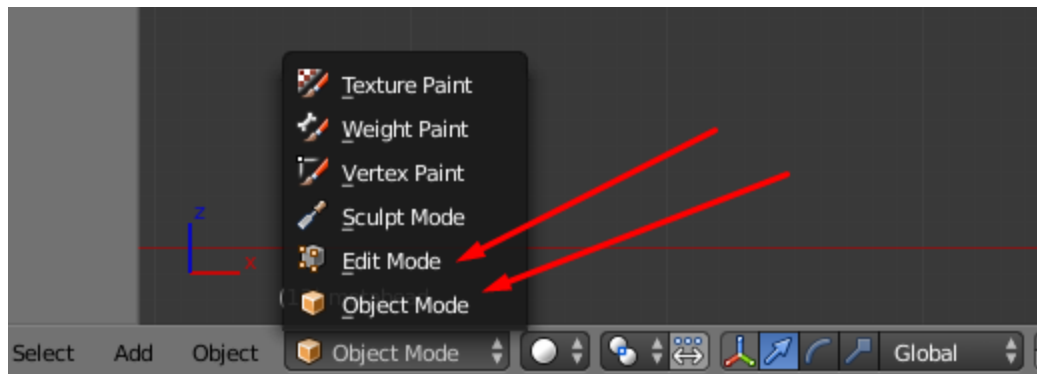
Mask Making Tutorial Blender File:

<https://drive.google.com/file/d/193qGvVJvSQ8Y11nLT7zQWxGq1aN6hSUM/view?usp=sharing>

Essential Tools and Hot Keys in Blender (For version 2.79):

Essential Tools

Modes: Modes are accessed by the bottom toolbar of Blender. The ones you will mainly be using are Object Mode and Edit Mode. These two modes are further described below.

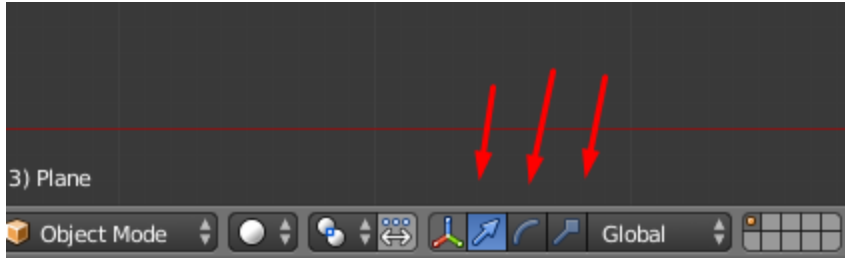


Object Mode: this mode is what allows you to affect objects within a space. You can create objects, move objects, rotate objects, and scale objects. You cannot change the shape of the object itself though.

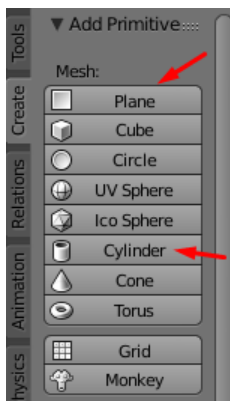
Translate: the arrow button. This allows you to move the object on the x, y, and z axis.

Rotate: the curve button. This allows you to rotate the object on the x, y, and z axis.

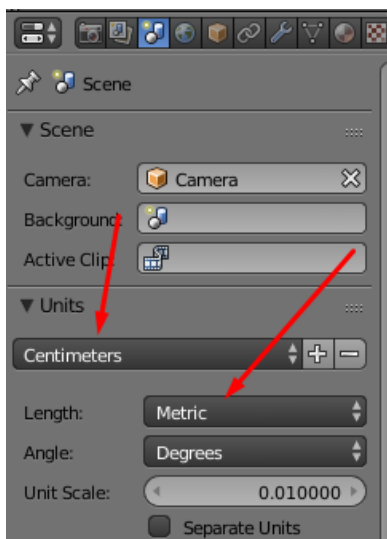
Scale: the straight line with the square at the end button. This allows you to scale the object on the x, y, and z axis.



Create Mesh: This tool adds meshes to the world. You can find this on the Create tab on the left. The most common ones I use is plane and cylinder. Plane creates the surfaces of the Kanohi. Cylinders can help to create circular details on the Kanohi including scopes. The rest of the meshes I don't use often but I am sure you can be creative with those.



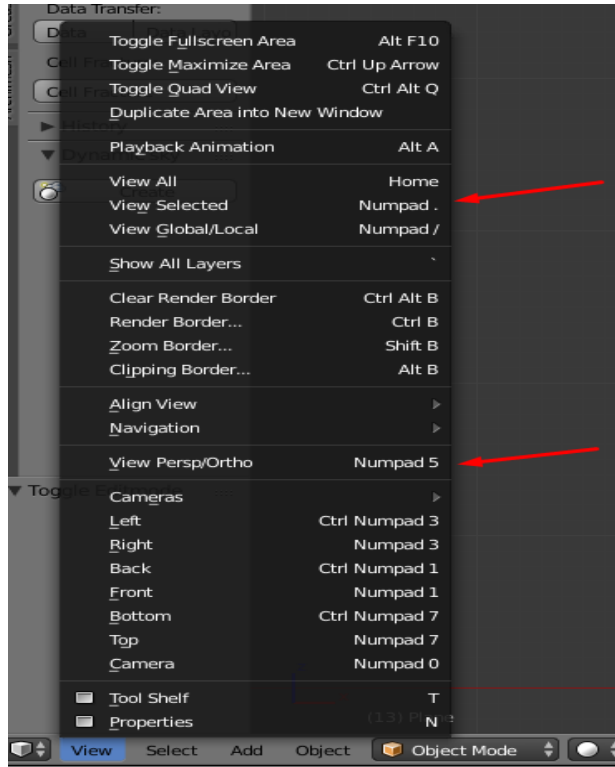
Units: This is to set the units used in your world. You can find this on the Scene tab on the right. The icon looks like a light next to a cylinder and sphere. This is especially important when it comes to making sure the dimensions of your Kanohi are correct for 3D printing. I put my units in centimeters. Lego is headquartered in Europe so it makes sense for them to use the metric system instead of imperial.



View: This button will help you to navigate around the model. There are two key buttons you need to know.

View Selected: allows you to view the selected object. This is important mainly if you're making multiple copies of the mask in the space.

View Persp/Ortho: lets you switch between perspective and orthogonal view. I keep my settings at orthogonal mostly because it helps to look at the model straight on without any distortions in the camera view.



Modifiers: Modifiers can help to give your model a polished look, smoothen out edges, provide thickness, and maintain consistency. Usually, this comes into play during the 3D modeling process. All modifiers can be found on the right side of the interface at the button that looks like a wrench.

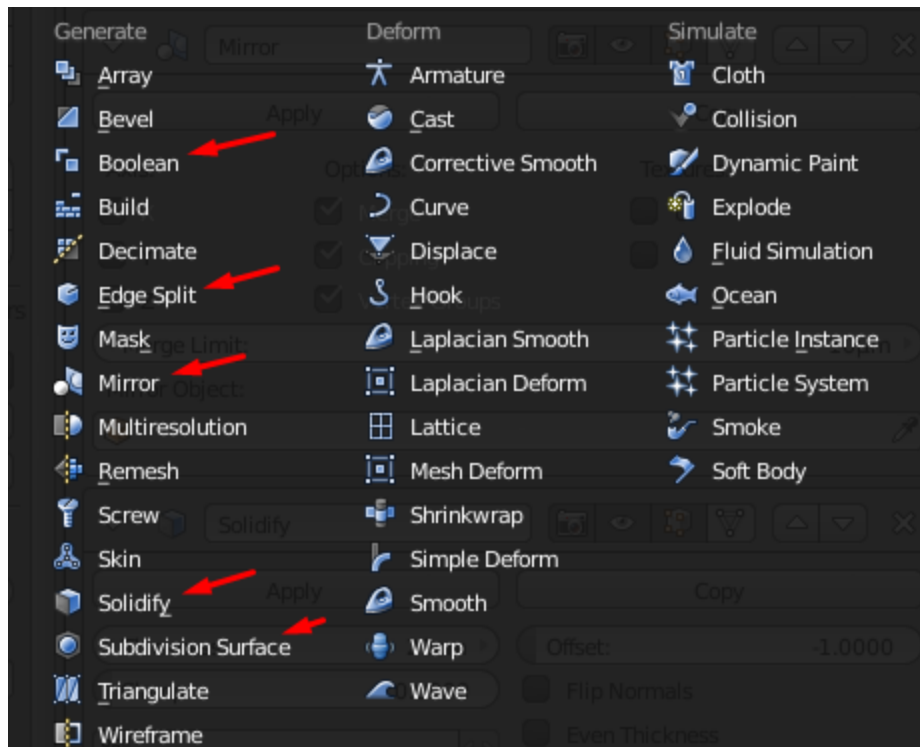
Boolean: used for cutting holes into the mask. This tool can be useful when you want to cut shapes into the mask using another mesh. It is advised to use this sparsely since cutting holes in the mask can produce thin wall issues.

Edge split: usually used for displaying purposes only. For example: if I did a smooth shading on my model, putting an edge split might make the model appear better by sharpening the edges. This is really good if you want to render an image of the mask and make it look pretty. Note that due to file formatting, such looks after edge split may not be retained when exported as an obj or stl file.

Mirror: takes the model you have and reflects it on the other side of an axis. This tool is particularly useful in Kanohi making since most masks are symmetrical.

Solidify: provides thickness to planes. This is required especially if you're modeling a mask that will have some sort of volume to it. I set the thickness of solidify to 20 cm.

Subdivision surface: mainly used for smoothing out rough edges. It does so by adding more vertices to your existing model. I do this as a last step to make my Kanohi look smoother and less poly like.



Duplicate: allows you to duplicate the model. This is my way of saving progress on the mask and it is crucial that this is done before you apply a modifier. Blender can only undo so much.



Join: allows you to join two or more objects together. This is useful to keep your Kanohi, any attachments, and your axle in one model.



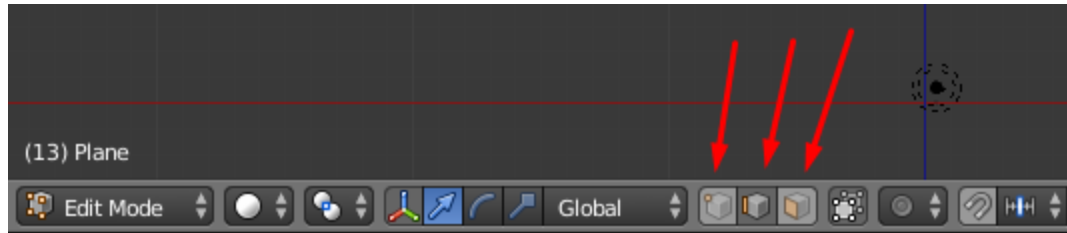
Edit Mode: this mode allows you to affect the object itself. This means you can change the shape and edit the mesh of the object.

There are three things in a mesh that can be edited: vertices, edges, and faces.

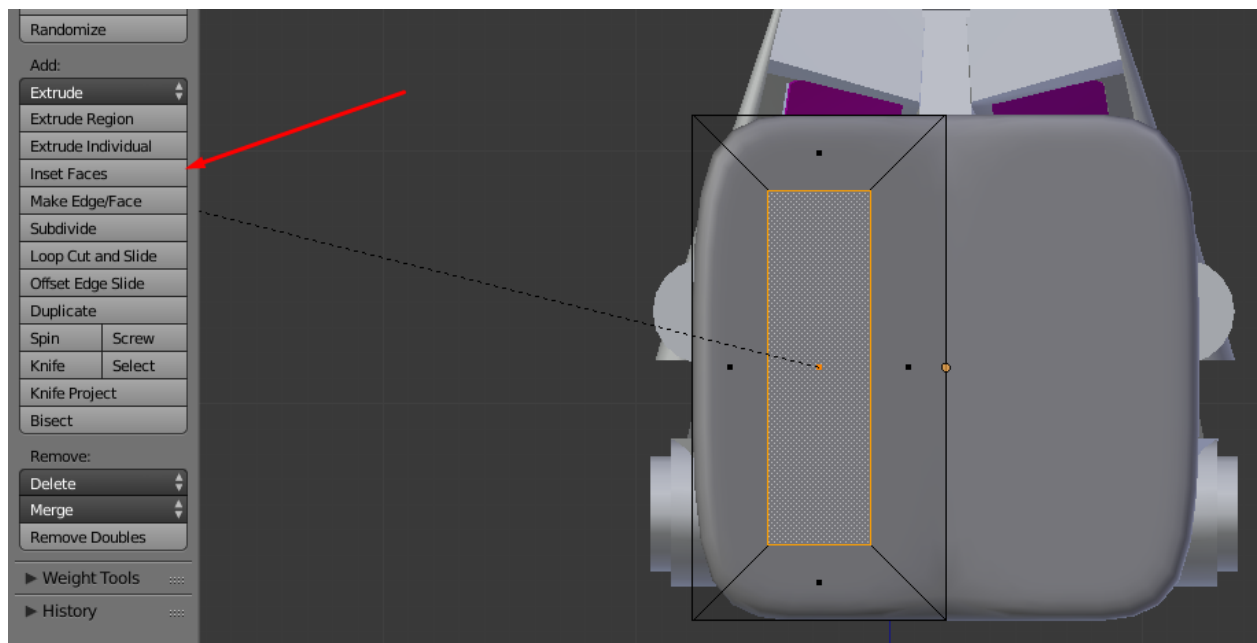
Vertices: the points in a mesh.

Edges: the segments in a mesh or the connection between two vertices.

Faces: the polygons in a mesh or the connection among at least three edges or among at least three vertices.



Inset Faces: allows you to create a “frame” surrounding a face. This is particularly useful for creating indents or holes within the mask.



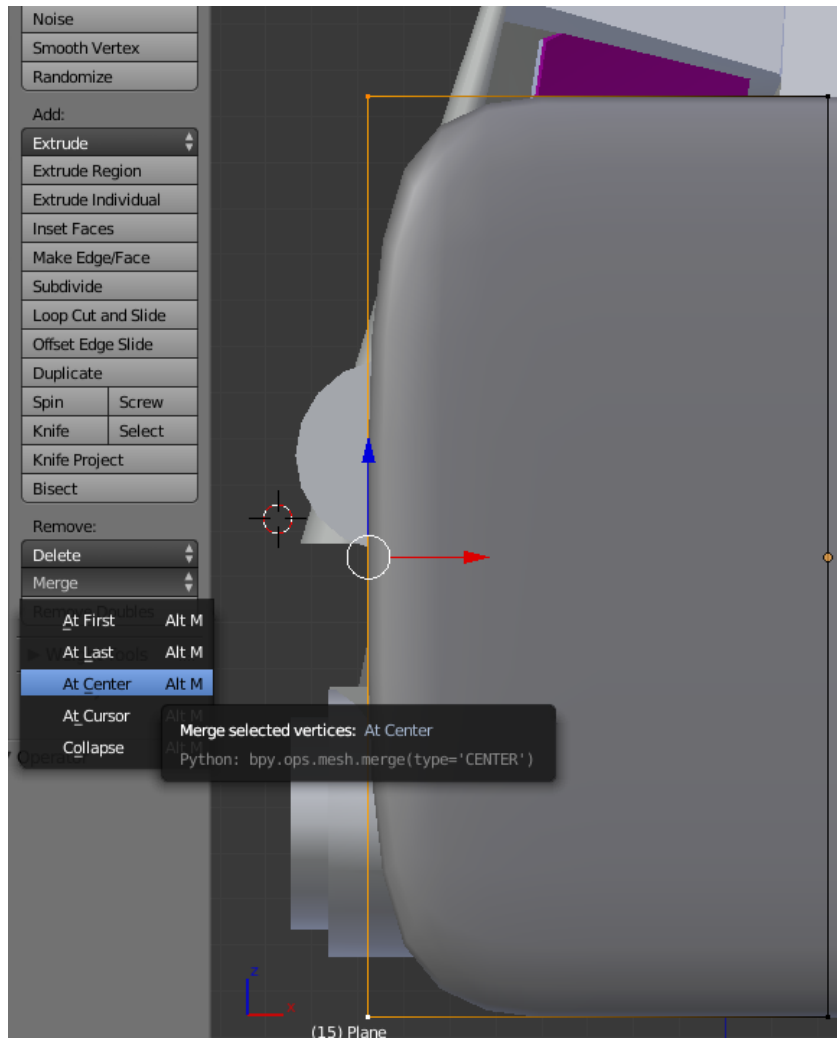
Merge: allows you to merge vertices together. Depending on your selection, it will merge two vertices in different positions.

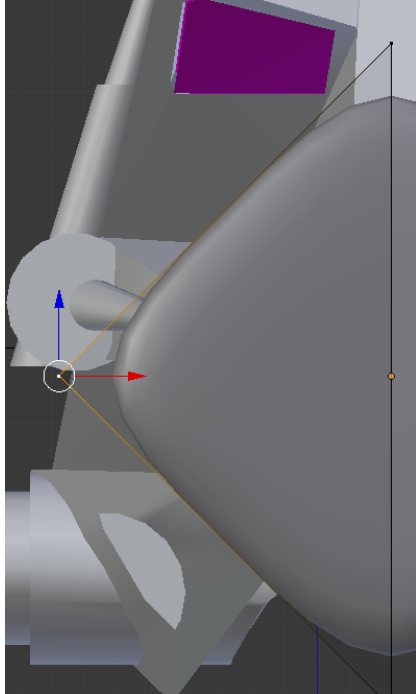
At First: merges all vertices to be positioned at the location of the first vertex you've selected.

At Last: merges all vertices to be positioned at the location of the last vertex you've selected.

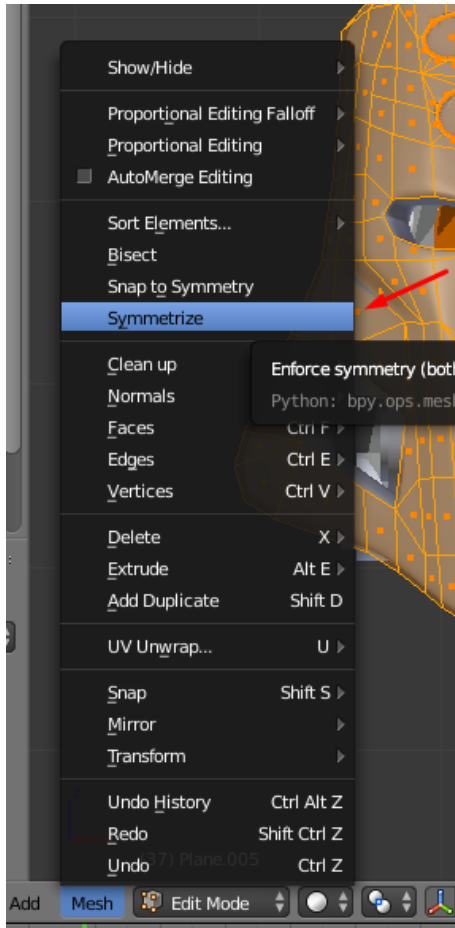
At Center: merges all vertices to be positioned at a center point equidistant from all the vertices selected.

At Cursor: merges all the vertices at the position of the cursor cross eye or where you last left-clicked with your mouse.





Symmetrize: allows you to reflect the vertices, edges, and faces of the mask depending on which axis you want to reflect it off of. This is usually done during Step 2. DO NOT USE WHEN MIRROR MODIFIER HAS NOT BEEN APPLIED.



Remove Doubles: allows you to remove overlapping vertices from your model. This is particularly important for 3D printing since sometimes, the 3D printer cannot interpret overlapping vertices. Removing Doubles should only be used in Step 1, Step 2, and Step 4. If used during Step 3, it will undo all sharpening on the mask.

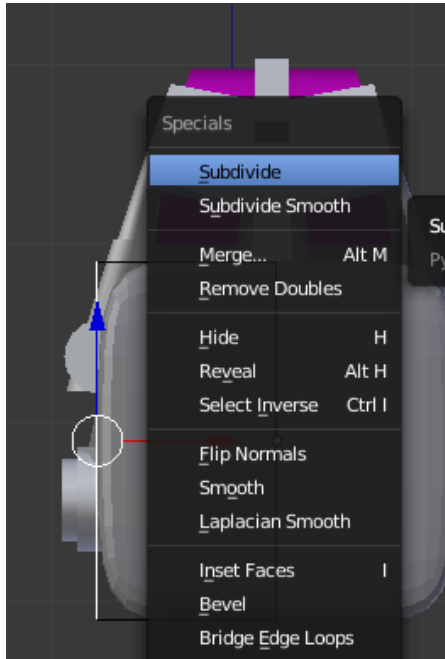


Hotkeys

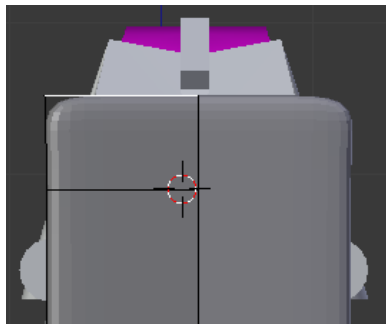
Hotkeys: There are plenty of shortcuts that allow a person to edit settings quickly. Here is a list of hotkeys that are essential for 3D modeling Kanohi. Keep in mind that hotkeys are different depending on what mode you're in. Viewport contains hotkeys that work in both Edit and Object Mode.

Edit Mode:

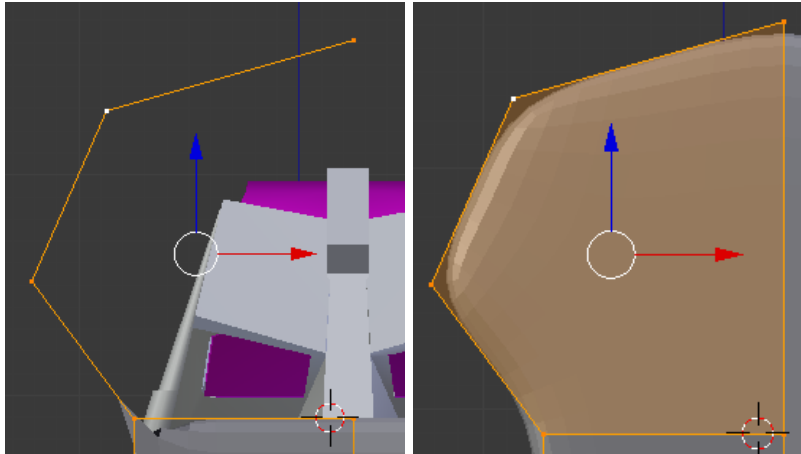
[W] = allows you to select subdivide to cut edges/faces in half. To cut a face in half, select two parallel edges.



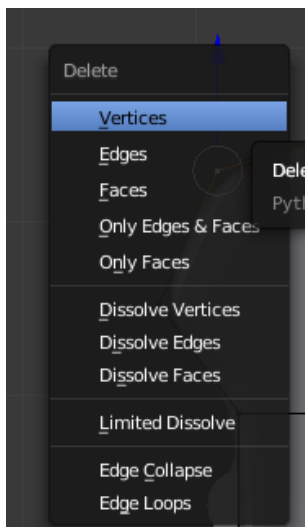
[E] = allows you to extrude vertices, edges, and faces from existing vertices, edges, and faces. This is especially important when creating holes, indents, or raised faces.



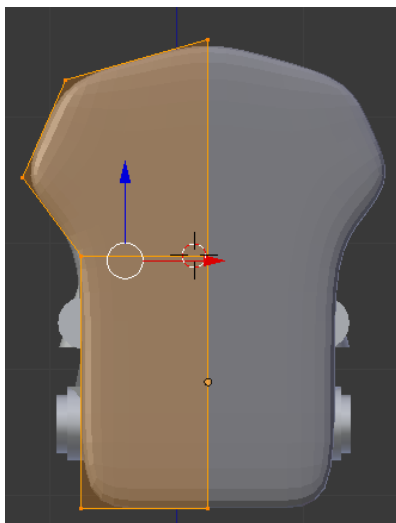
[F] = allows you to connect at least two vertices, edges, and faces. Try to keep the faces to at most 5 vertices per face.



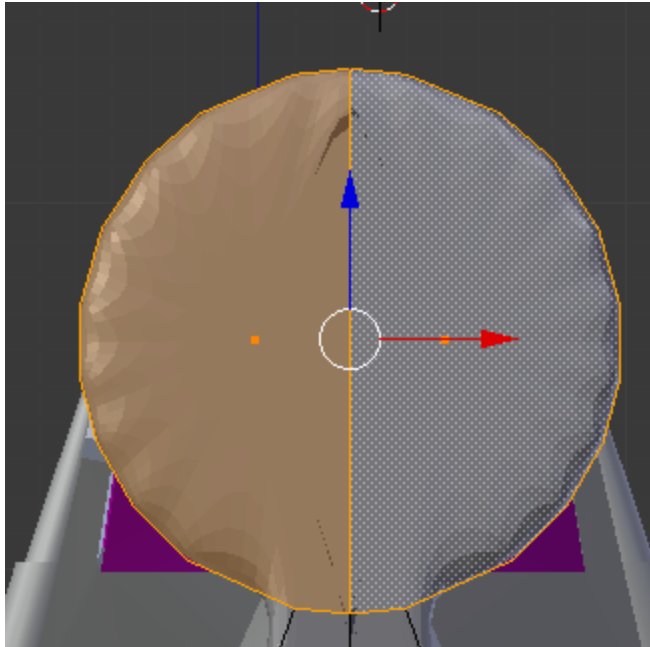
[delete] = allows you to delete vertices, edges, and faces. Note: make sure you know what you're deleting so you know which button to select. This button can be a lifesaver if something looks weird or some faces are not where it's supposed to be.



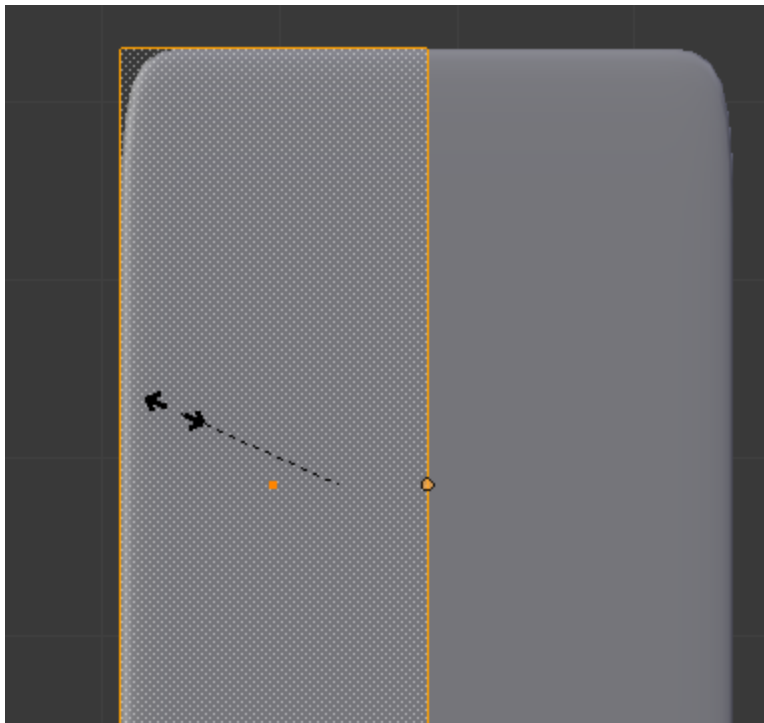
[A] = allows you to select/deselect all vertices, edges, and faces.



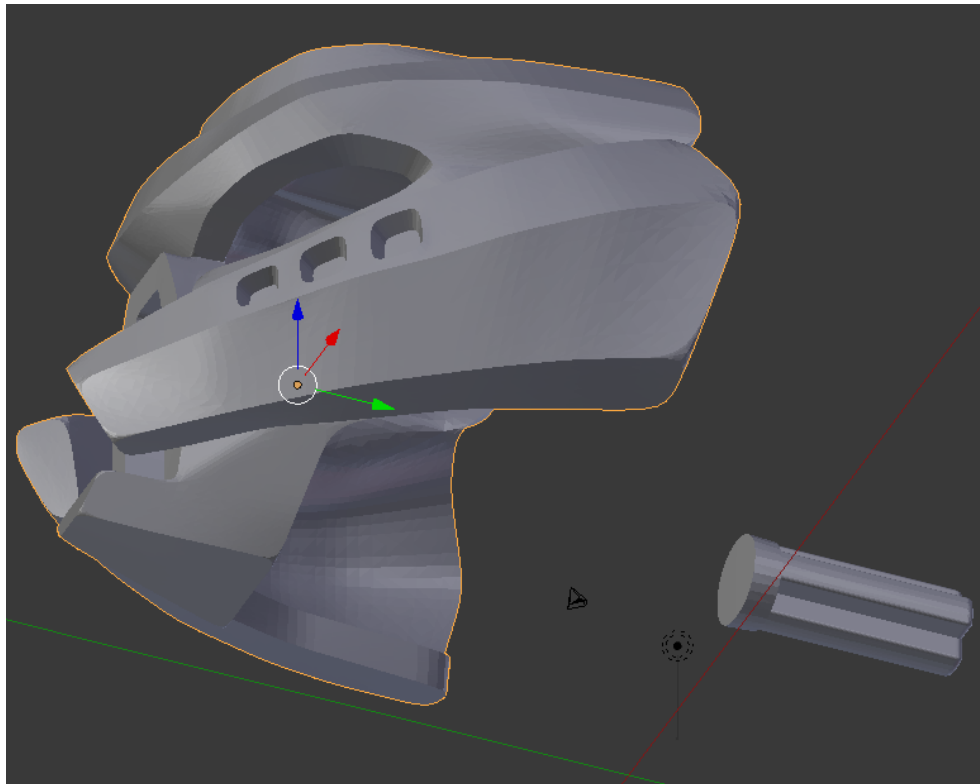
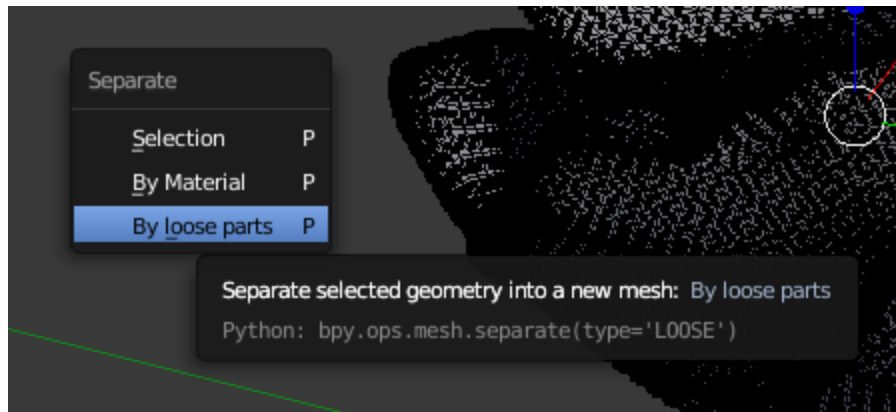
[Shift+Alt+S] = allows you to rearrange the vertices in a circle. This is particularly useful for creating circular indents/holes and pairs well with subdivize.



[S] = allows you to scale whatever is selected from all three axes. Note that it will NOT affect the modifiers applied.



[P] = allows you to separate two joined meshes to create two separate mesh objects. I usually use the “By loose parts” option to separate two meshes that are loose. This is useful if you need to adjust an axle length on a mask.



Object Mode:

[ctrl+shift+alt+c] = allows you to change the origin point of your model. This can change the mirroring of the mask as well as its symmetry. It can be used to find the center of your object.

Viewport:

[alt+middle mouse button] = allows you to rotate and lock the camera at different positions around the mask. This is particularly important for front, side, and top views.

[Z] = allows you to toggle wireframe mode. This is helpful for aligning things (like axles) that you cannot see from the front and can also help to align vertices that you cannot see from the back.
[Shift+right mouse button] = allows you to select more than one vertex, edge, or face. This is useful for manipulating multiple shapes and for sharpening.
[Ctrl+Z] and [Ctrl+Shift+Z] = allows you to undo and redo steps. Please note that Blender will only allow you to undo and redo a limited number of steps. This is why copies of your mask is important.

Part III: Setting Up the Template

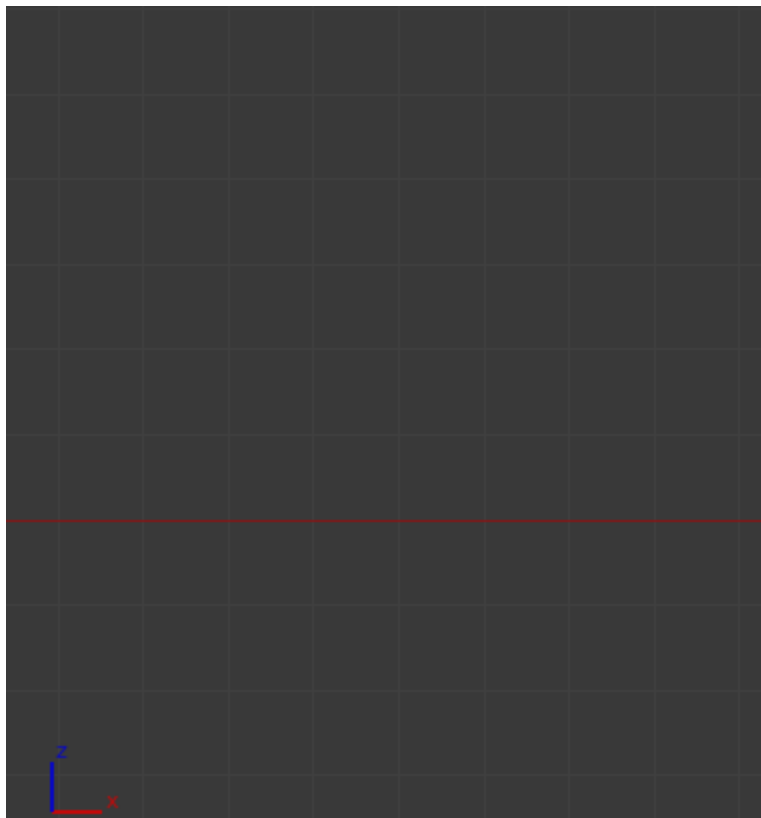
Here is the tutorial file in case you want everything to be set:

Mask Making Tutorial Blender File:

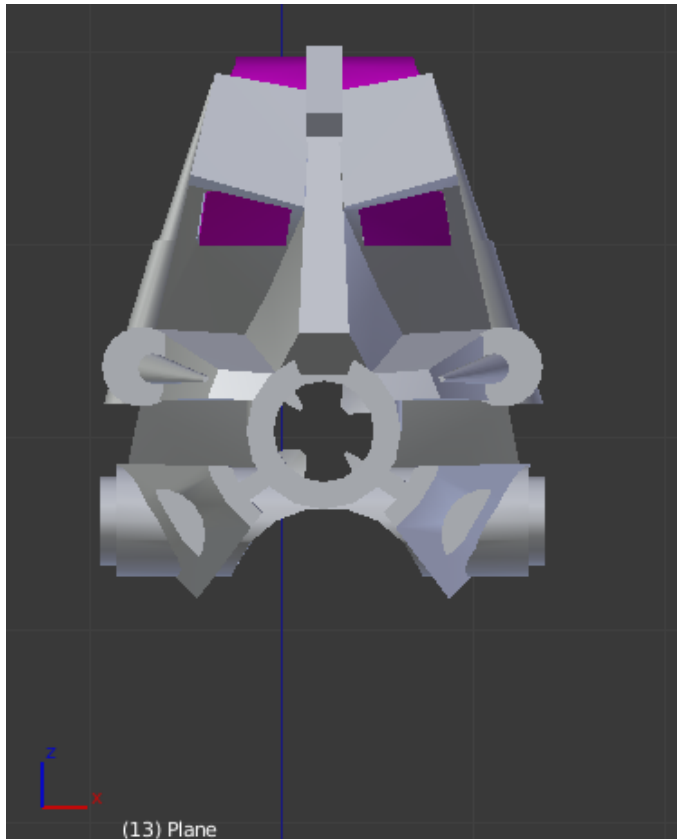
<https://drive.google.com/file/d/193qGvVJvSQ8Y11nLT7zQWxGq1aN6hSUm/view?usp=sharing>

If you do not have access to the tutorial file or want to start from scratch, I can tell you the settings that you will need before you start.

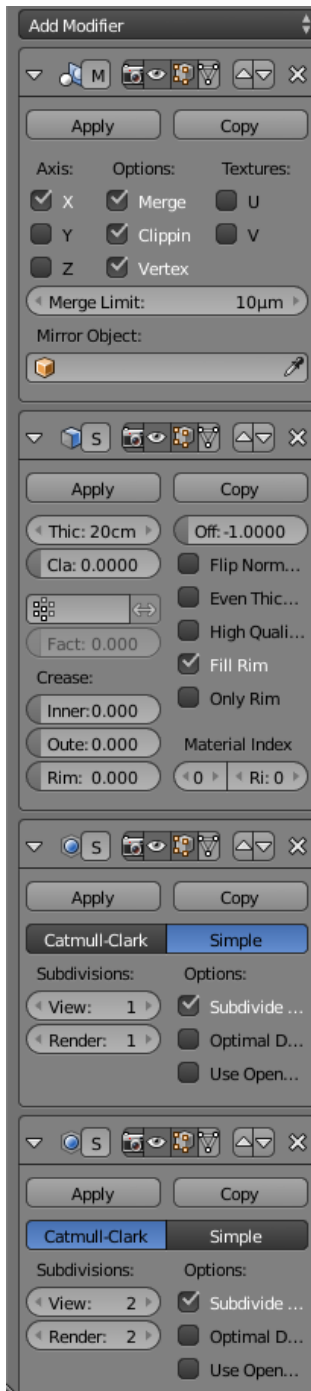
First, you need to set the units of space. Go to Scene and set your Units to centimeters. Next, go to View and set your perspective view to orthogonal view. The default cube can be deleted. It should look like this:



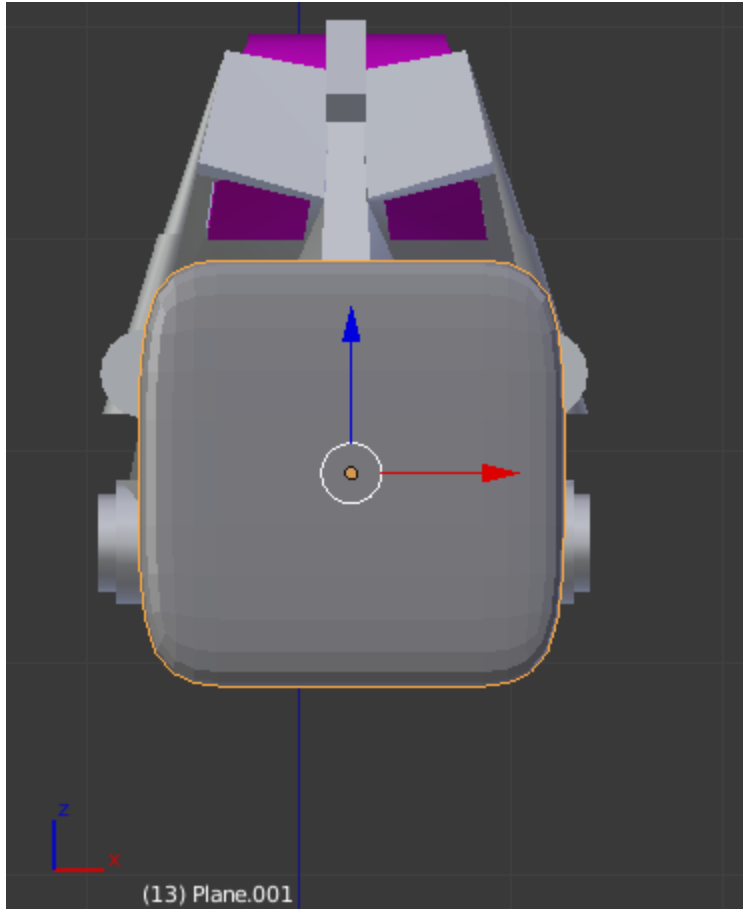
Second, you will need a head model. These head models can be requested from me but should also be in the tutorial file mentioned earlier. My recommendation is to have a Mata head. If your mask can fit a Mata head, it should do fine with a Metru head also. What I have done is combine the Mata and Metru heads together to ensure the mask fits both heads. But, for the sake of simplicity, the Mata head is depicted for the rest of this tutorial.



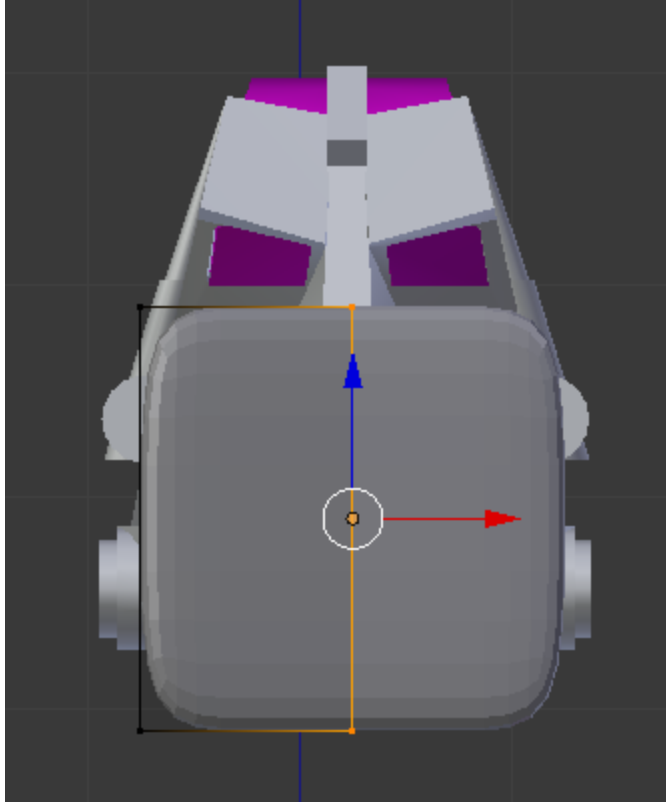
Third, you will need to insert a plane and modify it. Create a plane and orient it in front of the head using the translate and rotate tools. Then, add these modifiers in THIS order below as well as put the modifiers with these settings below: mirror, solidify, subdivision surface, subdivision surface.



If you've set these settings properly, you should get this:



Lastly, you will need to shift the vertices in the plane to the left. Select the plane and switch to edit mode. Then, select the vertices at the right of the plane and translate them to the left. You will notice that the vertices will stop at the middle of the plane. This “locking” is due to the mirror modifier’s clipping feature and it is a normal thing to happen. Once everything is set, it should look like this:



When you have this, you are ready to create your first Kanohi!

Part IV: The Technique

Learning how to model a Kanohi is actually pretty easy. What makes it difficult though is mastering it. There are plenty of steps to model a mask but I will simplify it into 5 steps.

Step 1: Creating the Shape

The first step is to create the shape of the mask. This is where getting the shape of the mask happens and is where you manipulate the plane. For the majority of the time, you are simply manipulating the plane that you've created. The hotkeys you will be relying on the most in this step is extruding and creating faces by stitching them together. The shape of the mask is up to you but there are a few things to keep in mind when performing this step. I will list some below.

- While mirrored, extruding from the middle of the mask will **NOT** allow you to extrude at an angle. You need to extrude vertices, edges, and faces **AROUND** the middle.
- A mask is **NOT** supposed to be flat. Make sure to pull back and around the head. Provide some room between the head and the plane or else the mask may not fit. Look at the mask from all sides to make sure the vertices are in the proper position.
- Keep vertex count low on faces. Faces should have at most 5 vertices surrounding it. Anything more is only used if you're trying to create a circle. I stick to three or four vertices surrounding a face.

- Watch for darker face clipping. If you're extruding and you see any places where it is showing a darker face, make sure to fix it by moving the extrusion somewhere else. It is an indication that you might encounter a thin wall issue.
- Watch for lighter gray circular patches on your faces. If you see that, it means the face is not flat enough and is too curved. This can be fixed by either reducing the number of vertices, moving the vertices around, or subdividing the faces.
- Any holes or indents should be given some faces surrounding the hole or indent. Otherwise, the holes or indents will lack depth into the mask.
- Cylindrical objects can either be added during this step and stitched on to the mask through Merging and/or stitching faces or can be added later on in Step 2.
- If the vertices get messy, Merge Merge Merge. Merging vertices helps to clean up the model. If the merging does not help, you can delete the vertices and re-stitch the faces again.
- Have as little attachments to the mask as possible and avoid making the mask in multiple pieces. The reason why is because the mask will have uneven thickness if made in fragments and it is easier to break. When modeling, make sure the mask is in one piece unless you absolutely need to make it into more than one piece. Having less attachments makes it easier for a repair software to repair the file as well as makes the mask more compatible with 3D printers.
- Subdivide is your best friend. If you want to make a face more curvy, subdivide the face by splitting in half and adjusting the edge or vertices. Repeat the process to make it more curvy. The more subdivides you make, the less blocky the surface will look.
- Circular surfaces can be created by selecting a face and subdividing the face and then doing the hotkey to rearrange the vertices into a circle. If your faces have only four vertices, you can add more by selecting edges individually and subdividing it. 5 vertices or more will allow you to rearrange the vertices into a circle.
- If you're looking to create variations, make sure to make multiple copies of the mask before proceeding to make a new variation. The undo key can only undo changes a certain number of times.

Once you've finished the shape of the mask, you will get something like this:



Notice that the mask may not look sharp. The sharpening step will come later. Once you are finished with your mask, **DUPLICATE** the mask to create a copy in case you plan to edit it in the future. This is very important because you can only undo so much in Blender. After a copy has been made, apply the first two modifiers (Mirror and Solidify) or first modifier (Solidify) if you're not planning to have the mask mirrored. Applying Mirror will mirror the vertices on to the other side of the mask. Applying Solidify will provide volume to the planes that you have placed.

Step 2: Adjusting the Thickness (Optional)

This step is optional. However, in some cases, it might arise where your model might have some of the darkened faces leaking through the walls of your mask. In this step, you will be focused on moving vertices around. If you see any darkened faces, move the vertices into the solid parts of the mask. If you feel like a face, edge, or vertex is misplaced, you can delete it and restitch it. Keep in mind that during this step, the thickness of your mask may turn out to be inconsistent so be careful when editing. You do not want your mask to have thin walls. If you want to further clean up the mask, you can clean up the back of the mask by merging vertices together. This can help especially for 3D printing since the 3D printed supports can be removed from the printed mask easier. I usually only do this step in special circumstances including if the 3D printer is unable to print my mask properly.

Step 3: Sharpening

This step is all about sharpening the mask. The basic premise is this: you sharpen what you want to be sharpened and you don't sharpen what you don't want to be sharpened. To sharpen the mask, you have to go into edit mode and select the faces that you want sharpened. Then, you press E and left click. **DO NOT MOVE YOUR MOUSE CURSOR WHILE PRESSING E.** If done correctly, what should happen is that a new face will be produced that overlaps the

selected face. Having two faces on top of each other emphasizes the sharpness of that shape. Select multiple faces to sharpen all the faces at once. If you decide to sharpen only one side of the mask, you can use Symmetrize to flip the sharpening on to the other side of the mask to save you some effort and time. Note that once you've sharpened the mask, it is difficult to undo it. If you have sharpened a region of the mask that you do not want it to be sharpened, you will have to select all, remove doubles, and start over. Another fix that can be done is selecting the multiple vertices in the same location and merging them, though this can be a lot of work and should be done for minor errors. I have had some success with selecting only the few vertices that I don't want sharpened and removing doubles on those but it may affect the entire mask if not done properly. If done correctly, your mask should look like this:



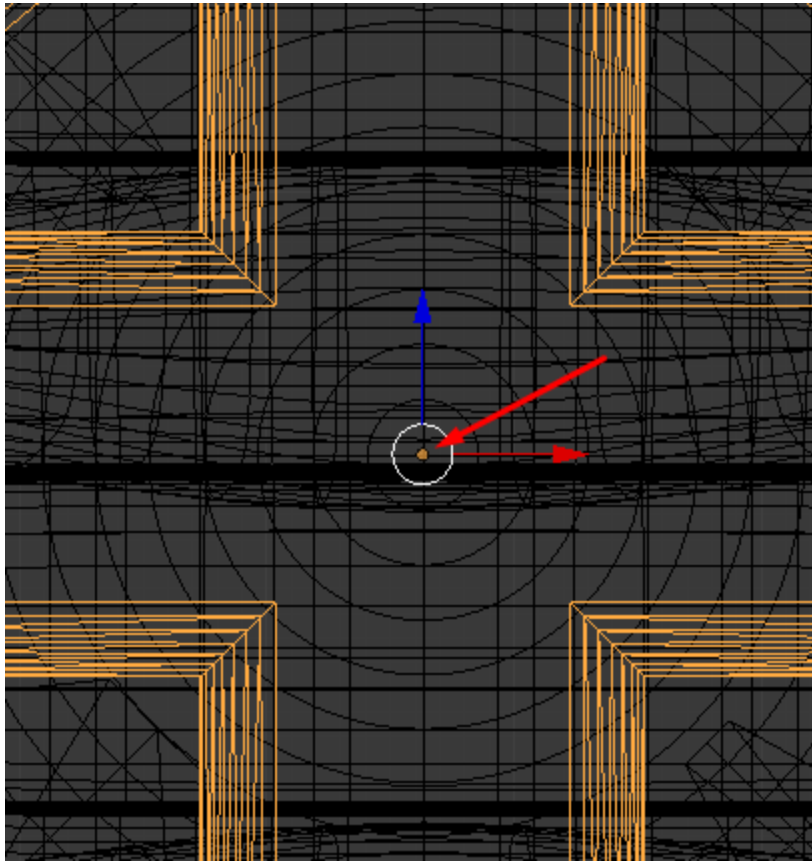
Notice how the curved parts of the mask are finally sharpened and look more refined. Note: there are some masks that are exempt from sharpening and usually those have to deal with more organic masks like Nuva masks.

Make sure to **DUPLICATE** the mask to create a copy. Once you're done, you can now apply the two modifiers (Subdivision Surface and Subdivision Surface). The resulting mask will have plenty of vertices on it which will preserve the curves of the mask as well as make the mask difficult to edit (and that's why we keep a copy of it in case we need to make changes).

Step 4: Clean Up and Adding the Axle

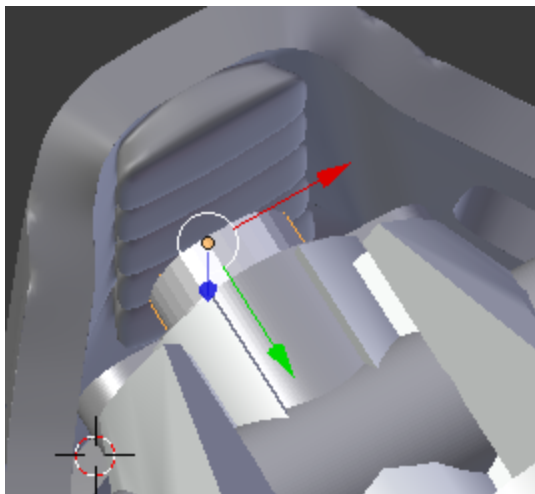
At this step, you will need to clean up the mask by simply removing any doubles involved. Go into Edit mode, Select all, and remove all doubles. This will remove any overlapping vertices that might be left over on the mask. Once this is done, it is time for you to align the axle. To align the axle, make sure you are in wireframe mode. Translate the axle to be at the center of

the circle that outlines the ball joint of the Metru Head or the center of the axle hole of the Mata Head. Watch your axle and figure out how far it needs to be from the back portion of the mask. When aligned properly, the axle should look like this:



Notice the origin point of the axle is at the center of the “bulleye” of the head ball joint of the Metru Head or the center of the axle hole of the Mata Head.

Check the axle from the back to see it is connected or embedded into the back of the mask.

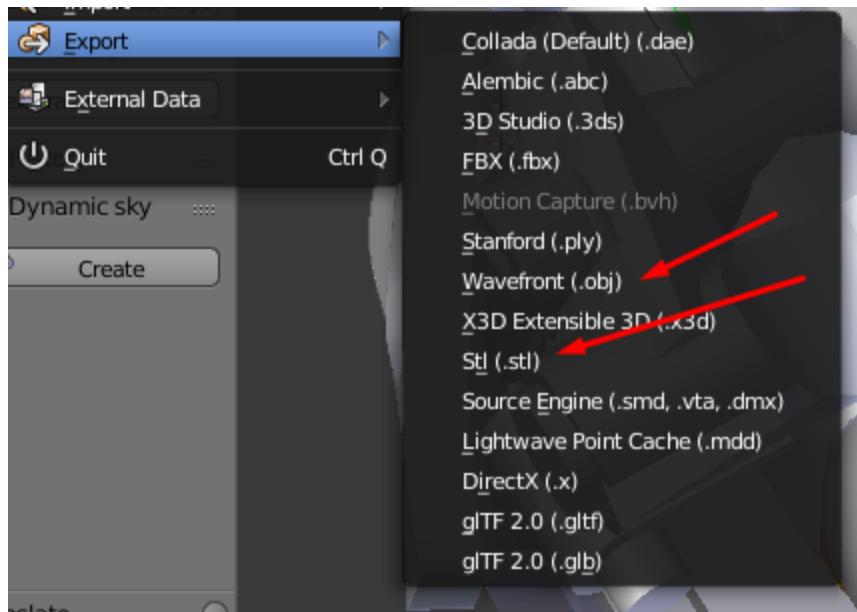


This is a sign that you’re almost at the finish line. When you feel like you’re done, **DUPLICATE BOTH THE MASK AND THE AXLE** and then join the axle to the mask, with the mask being the

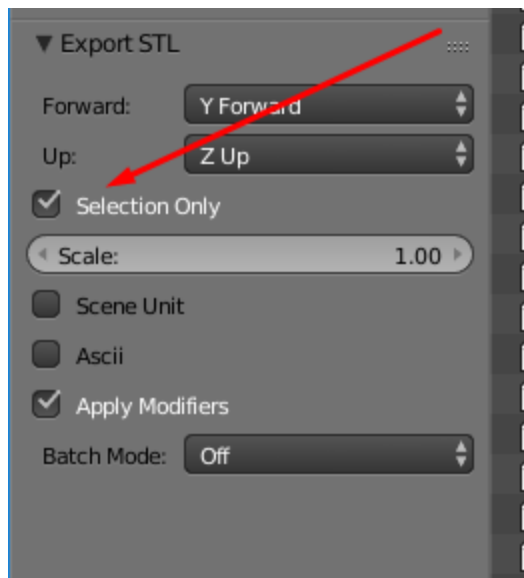
last selected object. If this is done correctly, the mask and the axle should translate as one piece.

Step 5: Repairing and Publishing

With the axle and mask now as one, it is time for repairing the mask. The first thing that must be done is that the mask must be exported as an .stl or .obj file. I prefer .stl file but either one works. Select your mask and export the model.



Make sure to export Selection Only or else you will export your entire blender space.



Once this is done, your mask will finally be in the form of an .stl file. However, you're not done yet. Your file needs to go through a 3D repair software in order for the model to be reproduced as a 3D print. There are three places you can go to repair the 3D model.

Azure Website: this is an online 3D repair website that allows you to upload your model and repair the file. The website outputs a .3mf file so you will need to convert that .3mf file back into an .stl file. <https://tools3d.azurewebsites.net/>

3D Builder: This is a 3D model software that may already be present in your computer. When your .stl file is opened in the software, it will notice places that need repairing. Select the option to repair the file. It will take a little bit but once it is done, you can save the repaired .stl file on to your computer. This is probably the quickest way to get things repaired.

Shapeways: Anything uploaded onto Shapeways will automatically go through a repairing process. The uploads may take a bit to do but once it is done, you can download your repaired file directly from Shapeways. If you're planning to sell your masks, putting it on Shapeways will take care of the file if it has any errors or requires repairing.

It should be pointed out that Thingiverse **DOES NOT** have repair software. Therefore, if you upload your mask model without repairing it, anyone who has a 3D printer may experience issues printing your mask. Do not upload your file until it is repaired if you plan to share it.

If you have done all of these steps correctly, you have successfully created a mask that is able to be 3D printed. Congrats!

Part VI: Final Thoughts and Tips

As I have said before, learning to 3D model a mask is actually easier than you think it is. However, mastering the technique is what makes it tough. 20% of the time, you will be invested in putting down the faces, vertices, and such. 80% of the time, you will be adjusting the position of the vertices to be exactly where you want it to be. This "adjustment" aspect takes a very sharp eye and requires a lot of time to master. It is what makes up 3D modeling Kanohi masks the majority of the time. You will need to experiment a lot of different looks and styles and focus in on getting that Bionicle aesthetic correct. It is easy to model the mask, but it is not easy to model a BIONICLE mask.

Here are my final thoughts for you to ponder on:

- Take time to practice. I cannot emphasize this enough. A lot of the hotkeys and buttons I've introduced are the most common ones that I have had to use. Practice using them and knowing when to use them. Many of them have advantages and limitations that will only be discovered when you practice. So practice, practice, practice.
- Keep your mask in one piece, not many. A fragmented mask is no good for 3D printing and is prone to fracture. Always keep the thickness consistent throughout the mask. Keeping your mask in one piece will make the mask applicable for anything Bionicle and even things outside of Bionicle.
- Do not hesitate to ask. I am always willing to help whenever you're stuck on something. Just be sure to let me know and I can help. There are also other 3D modelers out there who are willing to share their knowledge with you if you ask.

- Make it your style. Your style is what defines you. The Kanohi that you make will define you. Focus on a style that you want to model and stick to that and your designs will not only have that Bionicle feel, but will also represent you.
- Share the knowledge. 3D modeling has opened plenty of doors to bring imagination and headcanons to come to life. Spread the word and introduce people to this new creative medium.

